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EXAMINER	
MERKLING, MATTHEW J	

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1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/763,951	JOHNSON ET AL.	
	Examiner	Art Unit	
	MATTHEW J. MERKLING	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 July 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7,11-14,18-21 and 24-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,11-14,18-21 and 24-34* is/are rejected.

7)☒ Claim(s) *1,21 and 25* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 1, 21 and 25 are objected to because of the following informalities: In claim these claims, there appears to be a typographical error in the group listing of catalyst materials. The material 'cadium sulfide' should be 'cadmium sulfide' and will be examined as such.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-5, 11-13 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishimura (JP 2003-334424) and evidenced by Kinkade (US 4,994,498).

Regarding claims 1-5 and 21, Nishimura discloses a fluidized-bed reactor (10) comprising:

a chamber defining a hollow interior region and having a lower surface (bottom of vessel 10), the lower surface defining a portion of the hollow interior region;

a first input (11) for introducing a contaminated gas into the hollow interior region, the contaminated gas comprising at least one hydrocarbon contaminant;

a plurality of catalyst nanoparticles (see abstract) within the hollow interior region and located on the lower surface; and

a fluidizing input (11) for introducing a fluidizing material into the hollow interior region, said fluidizing input having an outlet directed towards the lower surface (see Drawing 2) and between about 0° to 90° with respect to the lower surface of the chamber (see Drawing 2 where fluidizing input 11 is angled at a variety of angles, all of which fall between about 0° to 90°) such that the fluidizing material fluidizes at least a portion of the plurality of catalyst nanoparticles located at the lower surface of the chamber to form a gaseous dispersion (fluidized bed is a gaseous dispersion), and

the fluidized catalyst nanoparticles react with the contaminated gas to produce a decontaminated gas (see abstract), the catalyst nanoparticles being selected from the group consisting of copper, ruthenium, osmium, platinum, silver, nickel, rhodium, palladium, gold, titanium dioxide, aluminum oxide, vanadium pentoxide, iron (III) oxide, zinc oxide, cadmium sulfide, zinc telluride, zirconium oxide, molybdenum disulfide, tin oxide, antimony tetraoxide, cesium dioxide, tungsten trioxide, niobium pentoxide and combinations thereof (see paragraph 12).

Nishimura discloses the use of catalyst nanoparticles that have an average particle diameter of between 5nm and 200nm (see paragraph 12) but does not explicitly disclose an average particle diameter of between 15nm and 25nm.

However, regarding the size of the particles, it was well known in the art at the time of the invention that the particle size of the catalyst in a fluidized bed is a variable that is routinely varied to achieve the desired performance and contacting efficiency between the process fluid and the catalyst (see paragraph 12 of Nishimura and Kinkade, col. 7 lines 51-59). As such the size of the catalyst particles is not considered to confer patentability to the claim. The size of the particles would have been considered a result effective variable by one having ordinary skill in the art at the time the invention was made. As such, without showing unexpected results, the claimed size of the catalyst particles cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the size of the catalyst particles in modified Miller to obtain the desired fluidized bed performance (In re Boesch, 617 F. 2d. 272,205 USPQ 215 (CCPA 1980)). Since it has been held that where general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (In re Aller, 105 USPQ 223).

Nishimura further discloses a second input (26) for introducing backpressure pulse of gaseous material (paragraph 20) and a gas permeable separation device (filter 25).

Regarding claims 11-13 Nishimura further discloses an ultraviolet light (15) positioned inside/outside the chamber (see Drawing 2 and paragraph 9).

4. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishimura (JP 2003-334424) and evidenced by Kinkade (US 4,994,498) as applied to claim 11 above, and further in view of Goswami (US 5,933,702).

Regarding claim 14, the Nishimura discloses all of the claims limitations, as discussed in claim 11 above, but does not teach a humidifier in communication with the first input (gas inlet).

Goswami teaches a photocatalytic reactor for reacting a gas to remove contaminants.

Goswami also teaches a humidifier (Fig. 1 (50)) on the gas inlet (18) to a photocatalytic/oxidation reactor (21) in order to provide the correct relative humidity for the complete oxidation and destruction of a microorganism in the photocatalytic reactor (col. 7 line 60 – col. 8 line 4).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the humidifier and photocatalytic/oxidation reactor of Goswami with the fluidized bed photocatalytic reactor of modified Nishimura in order to ensure the correct humidity for the complete oxidation and destruction of said microorganisms.

5. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishimura (JP 2003-334424) and evidenced by Kinkade (US 4,994,498) as applied to claim 21 above, and further in view of Ballantine et al. (US 2006/0078771).

Regarding claim 24, Nishimura, as discussed in claim 21 above, discloses a vessel with multiple inlets (process inlet and fluidizing inlet, along with a backpressure

backflow inlet). Nishimura, however, does not disclose a specific control strategy utilized by a control device that synchronizes the backpressure pulse valve with the first input valve.

Ballantine discloses a series of controlled valves introducing multiple fluid inlets to the same process space.

Ballantine teaches a valve synchronization process of closing an inlet valve (402) connected to a vessel (412) when a second inlet valve (401) is opened in order to prevent backflow through the first process valve (paragraph 42)

It would have been obvious to one of ordinary skill in the art at the time of the invention to change the control scheme of the valve controller in modified Nishimura to synchronize the valve opening of the second inlet with the valve opening of the first inlet such that when the second inlet valve opens, the first inlet valve closes in order to prevent back flow through the first inlet valve, as is taught by Ballantine.

6. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishimura (JP 2003-334424) in view of Ballantine et al. (US 2006/0078771) and evidenced by Kinkade (US 4,994,498).

Regarding claim 25, Nishimura discloses a fluidized-bed reactor (10) comprising:

a chamber defining a hollow interior region and having a lower surface (bottom of vessel 10), the lower surface defining a portion of the hollow interior region;

a first input (11) for introducing a contaminated gas into the hollow interior region, the contaminated gas comprising at least one hydrocarbon contaminant;

a plurality of catalyst nanoparticles (see abstract) within the hollow interior region and located on the lower surface; and

a fluidizing input (11) for introducing a fluidizing material into the hollow interior region, said fluidizing input having an outlet directed towards the lower surface (see Drawing 2) and between about 0° to 90° with respect to the lower surface of the chamber (see Drawing 2 where fluidizing input 11 is angled at a variety of angles, all of which fall between about 0° to 90°) such that the fluidizing material fluidizes at least a portion of the plurality of catalyst nanoparticles located at the lower surface of the chamber to form a gaseous dispersion (fluidized bed is a gaseous dispersion), and

the fluidized catalyst nanoparticles react with the contaminated gas to produce a decontaminated gas (see abstract), the catalyst nanoparticles being selected from the group consisting of copper, ruthenium, osmium, platinum, silver, nickel, rhodium, palladium, gold, titanium dioxide, aluminum oxide, vanadium pentoxide, iron (III) oxide, zinc oxide, cadmium sulfide, zinc telluride, zirconium oxide, molybdenum disulfide, tin oxide, antimony tetraoxide, cesium dioxide, tungsten trioxide, niobium pentoxide and combinations thereof (see paragraph 12).

Nishimura discloses the use of catalyst nanoparticles that have an average particle diameter of between 5nm and 200nm (see paragraph 12) but does not explicitly disclose an average particle diameter of between 15nm and 25nm.

However, regarding the size of the particles, it was well known in the art at the time of the invention that the particle size of the catalyst in a fluidized bed is a variable that is routinely varied to achieve the desired performance and contacting efficiency between the process fluid and the catalyst (see paragraph 12 of Nishimura and Kinkade, col. 7 lines 51-59). As such the size of the catalyst particles is not considered to confer patentability to the claim. The size of the particles would have been considered a result effective variable by one having ordinary skill in the art at the time the invention was made. As such, without showing unexpected results, the claimed size of the catalyst particles cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the size of the catalyst particles in modified Miller to obtain the desired fluidized bed performance (In re Boesch, 617 F. 2d. 272,205 USPQ 215 (CCPA 1980)). Since it has been held that where general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (In re Aller, 105 USPQ 223).

Nishimura further discloses a second input (26) for introducing backpressure pulse of gaseous material (paragraph 20) and a gas permeable separation device (filter 25).

Nishimura, as discussed above above, discloses a vessel with multiple inlets (process inlet and fluidizing inlet, along with a backpressure backflow inlet). Nishimura,

however, does not disclose a specific control strategy utilized by a control device that synchronizes the backpressure pulse valve with the first input valve.

Ballantine discloses a series of controlled valves introducing multiple fluid inlets to the same process space.

Ballantine teaches a valve synchronization process of closing an inlet valve (402) connected to a vessel (412) when a second inlet valve (401) is opened in order to prevent backflow through the first process valve (paragraph 42)

It would have been obvious to one of ordinary skill in the art at the time of the invention to change the control scheme of the valve controller in modified Nishimura to synchronize the valve opening of the second inlet with the valve opening of the first inlet such that when the second inlet valve opens, the first inlet valve closes in order to prevent back flow through the first inlet valve, as is taught by Ballantine.

7. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishimura (JP 2003-334424) in view of Ballantine et al. (US 2006/0078771) and evidenced by Kinkade (US 4,994,498) as applied to claim 25 above, and further evidenced by Breton et al. (US 3,997,447).

Regarding claim 26, Nishimura fails to teach the at least one control device is further configured to introduce the backpressure pulse of gaseous material through the gas permeable separation device for about 0.2 seconds and introduce at least one of the contaminated gas and the fluidizing material into the hollow interior region for about 0.8 seconds.

However, it was well known in the art at the time of the invention that the length and frequency of the backpressure pulses, has a significant effect on the performance and operation of a filter that utilizes this method of cleaning (see Breton col. 4 line 67 - col. 5 line 4 and col. 5 lines 36-49, where Breton discloses the preference for frequent backpulses in order to prevent buildup of catalyst on the boundary of a filter). As such, the timing of the backpulses is not considered to confer patentability to the claim, as the length and frequency of the backpulses is a variable that can be modified, as is taught by Breton, is considered a result effective variable. As such, without showing unexpected results, the claimed length of the backpressure pulses cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the length of the backpressure pulses modified Nishimura to obtain the desired mixing and flow distribution (In re Boesch, 617 F. 2d. 272,205 USPQ 215 (CCPA 1980)). Since it has been held that where general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (In re Aller, 105 USPQ 223).

8. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Becker et al (US 2002/0006368) in view of Zhou (US 6,500,969) and evidenced by Kinkade (US 4,994,498).

Regarding claim 1, Becker discloses:

A fluidized-bed oxidation reactor comprising:

a chamber (Fig. 1 (1)) defining a hollow interior region and having a lower surface (4);

a first input (6) for introducing a gas into the hollow interior region;

a plurality of particles (2) within the hollow interior region and located on the lower surface (4), and;

a fluidizing input (10) for introducing a fluidizing material into the hollow interior region (gas, paragraph 32 lines 4-5), said fluidizing input having an outlet directed at the lower surface of the chamber (see Fig. 1 (10), paragraph 26 lines 3-5). The entry of gas into a bed of catalyst will fluidize at least a portion of an already fluidized bed.

Furthermore, regarding limitations which are directed to a manner of operating disclosed system, neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP §2114 and 2115. Further, process limitations do not have a patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim.

While Becker teaches the catalyst containing metal (paragraph [0032]) such as gold, Becker fails to teach the plurality of catalysts as being nanoparticles.

Zhou also discloses an oxidation process (as does Becker) and the type of catalyst used in said oxidation process.

Zhou teaches nanoparticles comprising a metal (col. 8 lines 33-43) being utilized as the catalyst in an oxidation reaction in order to ensure high activity and selectivity of desired oxidation products (col. 5 lines 34-43).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the nanoparticles of Zhou in the fluidized bed oxidation reactor of Becker in order to ensure high activity and selectivity of the desired oxidation products.

Modified Becker teaches nano-sized oxidation catalyst in the range of 0.5 to 100nm (see Zhou, claim 15), but is silent on particle sizes in the range of 15-25nm.

Furthermore, regarding the size of the particles, it was well known in the art at the time of the invention that the particle size of the catalyst in a fluidized bed is a variable that is routinely varied to achieve the desired performance (see Kinkade, col. 7 lines 51-59). As such the size of the catalyst particles is not considered to confer patentability to the claim. The size of the particles would have been considered a result effective variable by one having ordinary skill in the art at the time the invention was made. As such, without showing unexpected results, the claimed size of the catalyst particles cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the size of the catalyst particles in modified Becker to obtain the desired fluidized bed performance (In re Boesch, 617 F. 2d. 272,205 USPQ 215 (CCPA 1980)). Since it has been held that where general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (In re Aller, 105 USPQ 223).

Regarding claim 2, Becker, further discloses that the nanoparticles will be fluidized by the inlet of gas from the first inlet (paragraph 32 lines 4-8).

Regarding claim 3, Becker further discloses a fluidized-bed chamber comprising a port (Fig. 1, (8)) for the exit of the decontaminated gas out of the hollow interior region (paragraph 35 line 9).

9. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Becker et al (US 2002/0006368) in view of Zhou (US 6,500,969) and evidenced by Kinkade (US 4,994,498) as applied to claim 1 above, and further in view of Miller (US 3,615,256).

Regarding claims 4 and 5, Becker, as modified in claim 1 above, teaches a fluidized bed reactor with an outlet port, but does not teach a gas permeable separation mechanism for the entrained catalyst in the exit stream or a second input for introducing a backpressure pulse of gaseous material into the hollow interior region.

Miller also discloses a fluidized bed reactor (Fig. 1) with an exit port (36).

Miller teaches a gas permeable separation device (44) in communication with both the port (36) and a second input (50), wherein the exit of gas from the hollow interior region (via conduit 56) through the gas permeable separation device (44) causes catalyst particles to collect upon the gas permeable separation device (filter) and the entrance of the backpressure pulse into the hollow interior region displaces collected catalyst particles (col. 1 lines 45-49) and allows said collected catalyst particles to join the fluidized catalyst particles (via conduit 26) and continue reacting with gas within the hollow interior region. Miller teaches this gas permeable separation mechanism as a means to separate the entrained catalyst from the outlet gas and return the catalyst to the reaction zone (col. 3 lines 39-58).

As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to add the gas permeable separation mechanism of Miller to the fluidized bed reactor of modified Becker in order to separate the entrained catalyst from the outlet gas and return the catalyst to the reaction zone. Furthermore, such a modification would amount to nothing more than a use of a known technique to improve similar devices in the same way and would have been obvious to one of ordinary skill in the art at the time of the invention.

10. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Becker et al (US 2002/0006368) and Zhou (US 6,500,969) and evidenced by Kinkade (US 4,994,498) as applied to claim 1 above, and further in view of Goswami (US 5,933,702).

Regarding claim 6, the modified Becker discloses all of the claims limitations, as discussed with respect to claim 1 above, but does not teach a humidifier in communication with the first input (gas inlet).

Goswami also discloses a photocatalytic/oxidation reactor for reacting a gas to remove contaminants via oxidation.

Goswami discloses a humidifier (Fig. 1 (50)) on the gas inlet (18) to a photocatalytic/oxidation reactor (21) in order to provide the correct relative humidity for the complete oxidation and destruction of a microorganism in the photocatalytic/oxidation reactor (col. 7 line 60 – col. 8 line 4).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the humidifier and photocatalytic/oxidation reactor of Goswami with the

fluidized bed oxidation reactor of Becker in order to ensure the correct humidity for the complete oxidation and destruction of said microorganisms.

11. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Becker et al (US 2002/0006368), Zhou (US 6,500,969) and Miller (US 3,615,256) and evidenced by Kinkade (US 4,994,498) as applied to claim 4 above, and further in view of Ballantine et al. (US 2006/0078771).

Regarding claims 7, modified Becker, as discussed in claim 4 above, discloses a vessel with two 'competing inlets' (process inlet and fluidizing inlet, competing with backpressure pulse inlets). By the term 'competing inlets', the examiner is referring to two independent inlets that are injecting fluid into the same space. Modified Becker, however, does not disclose a specific control strategy utilized by a control device that synchronizes the backpressure pulse valve with the first input valve.

Ballantine discloses a series of controlled valves introducing multiple fluid inlets to the same process space.

Ballantine teaches a valve synchronization process of closing an inlet valve (402) connected to a vessel (412) when a second inlet valve (401) is opened in order to prevent backflow through the first process valve (paragraph 42)

It would have been obvious to one of ordinary skill in the art at the time of the invention to change the control scheme of the valve controller in modified Becker to synchronize the valve opening of the second inlet with the valve opening of the first inlet

such that when the second inlet valve opens, the first inlet valve closes in order to prevent back flow through the first inlet valve, as is taught by Ballantine.

12. Claims 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Becker et al (US 2002/0006368) and Zhou (US 6,500,969) and evidenced by Kinkade (US 4,994,498) as applied to claim 1 above, and further in view of Sigai (US 4,585,673).

Regarding claims 18-20, the modified Becker discloses all of the claims limitations as discussed in claim 1 above, but does not teach a means for agitating the catalyst nanoparticles in the hollow interior region.

Sigai also discloses a fluidized bed chamber (Fig. 1 (15)).

Sigai teaches an agitation/vibrating/shaking system (Fig. 1 (17,19)) in order to fluidize a suspended solid (in this case, phosphor powder) and improve the expansion of the fluidized bed (col. 4 lines 46-50).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the agitation/shaking/vibrating means of Sigai with the fluidized bed oxidation reactor of Becker in order to fluidize the suspended solid and improve the expansion of the fluidized bed.

13. Claims 25, 27-30 and 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Becker et al (US 2002/0006368) in view of Zhou (US 6,500,969), Ballantine et al. (US 2006/0078771) and Miller (US 3,615,256) and further evidenced by Kinkade (US 4,994,498).

Regarding claims 25, 27 and 28, Becker discloses:

a fluidized-bed oxidation reactor comprising:

a chamber (Fig. 1 (1)) defining a hollow interior region and having a lower surface (4);

a first input (6) for introducing a gas into the hollow interior region;

a plurality of particles (2) within the hollow interior region and located on the lower surface (4), and;

a fluidizing input (10) for introducing a fluidizing material into the hollow interior region (gas, paragraph 32 lines 4-5), said fluidizing input having an outlet directed at the lower surface of the chamber (see Fig. 1 (10), paragraph 26 lines 3-5). The entry of gas into a bed of catalyst will fluidize at least a portion of an already fluidized bed.

Furthermore, regarding limitations which are directed to a manner of operating disclosed system, neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP §2114 and 2115. Further, process limitations do not have a patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim.

While Becker teaches the catalyst containing metal (paragraph [0032]) such as gold, Becker fails to teach the plurality of catalysts as being nanoparticles.

Zhou also discloses an oxidation process (as does Becker) and the type of catalyst used in said oxidation process.

Zhou teaches nanoparticles comprising a metal (col. 8 lines 33-43) being utilized as the catalyst in an oxidation reaction in order to ensure high activity and selectivity of desired oxidation products (col. 5 lines 34-43).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the nanoparticles of Zhou in the fluidized bed oxidation reactor of Becker in order to ensure high activity and selectivity of the desired oxidation products.

Modified Becker teaches nano-sized oxidation catalyst in the range of 0.5 to 100nm (see Zhou, claim 15), but is silent on particle sizes in the range of 15-25nm.

However, regarding the size of the particles, it was well known in the art at the time of the invention that the particle size of the catalyst in a fluidized bed is a variable that is routinely varied to achieve the desired performance (see Kinkade, col. 7 lines 51-59). As such the size of the catalyst particles is not considered to confer patentability to the claim. The size of the particles would have been considered a result effective variable by one having ordinary skill in the art at the time the invention was made. As such, without showing unexpected results, the claimed size of the catalyst particles cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the size of the catalyst particles in modified Becker to obtain the desired fluidized bed performance (In re Boesch, 617 F. 2d. 272,205 USPQ 215 (CCPA 1980)). Since it has been held that where general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (In re Aller, 105 USPQ 223).

Also, the modified Becker discloses a fluidized catalyst (2) in a reaction bed with an exit port (8) for the gas that has reacted, but does not teach the claimed nanoparticle separation from the effluent gas method and apparatus comprising:

a second input for introducing a backpressure pulse of gaseous material into the hollow interior region through the port, or

a gas permeable separation device in communication with said port and the exit of gas from the hollow interior region through the gas permeable separation device for separating catalyst nanoparticles and causing them to collect upon the gas permeable separation device and where the entrance of the backpressure pulse displaces the collected catalyst nanoparticles.

Miller also discloses a fluidized bed reactor (Fig. 1) with an exit port (36).

Miller teaches a gas permeable separation device (44) in communication with both the port (36) and a second input (50), wherein the exit of gas from the hollow interior region (via conduit 56) through the gas permeable separation device (44) causes catalyst particles to collect upon the gas permeable separation device (filter) and the entrance of the backpressure pulse into the hollow interior region displaces collected catalyst particles (col. 1 lines 45-49) and allows said collected catalyst particles to join the fluidized catalyst particles (via conduit 26) and continue reacting with gas within the hollow interior region. Miller teaches this gas permeable separation mechanism as a means to separate the entrained catalyst from the outlet gas and return the catalyst to the reaction zone (col. 3 lines 39-58).

As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to add the gas permeable separation mechanism of Miller to the fluidized bed reactor of modified Becker in order to separate the entrained catalyst from the outlet gas and return the catalyst to the reaction zone. Furthermore, such a modification would amount to nothing more than a use of a known technique to improve similar devices in the same way and would have been obvious to one of ordinary skill in the art at the time of the invention.

Also, modified Becker, as discussed above, discloses a vessel with a plurality of inlets. Modified Becker, however, does not disclose a specific control strategy utilized by a control device that synchronizes the backpressure pulse valve with the first input valve.

Ballantine discloses a series of controlled valves introducing multiple fluid inlets to the same process space.

Ballantine teaches a valve synchronization process of closing an inlet valve (402) connected to a vessel (412) when a second inlet valve (401) is opened in order to prevent backflow through the first process valve (paragraph 42).

It would have been obvious to one of ordinary skill in the art at the time of the invention to change the control scheme of the valve controller in modified Becker to synchronize the valve opening of the second inlet with the valve opening of the first inlet such that when the second inlet valve opens, the first inlet valve closes in order to prevent back flow through the first inlet valve, as is taught by Ballantine.

Furthermore, modified Becker does not teach the plurality of catalyst nanoparticles displaced from the gas separation device to join the fluidized dispersion of catalyst nanoparticles and continue reacting with the contaminated gas within the hollow interior region.

Miller also discloses a fluidized catalyst bed with a filter associated with the outlet (see Fig. 1 and abstract).

Miller teaches a filter membrane (44) that traps catalyst particles thereon during operation and then provides a backpulse through the filters to clean the trapped catalyst particles (col. 1 lines 45-49). Miller further teaches a recycling configuration in which the removed catalyst particles are removed from the filter (44) and reintroduced into the fluidized bed (via conduit 26).

As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the catalyst recirculation configuration of Miller to the modified Becker, in order to reutilize the catalyst that was trapped on the gas separation membrane. Furthermore, adding the catalyst recirculation configuration of Miller to the fluidized bed of modified Becker would amount to nothing more than a combination of prior art elements according to known methods to yield predictable results.

Regarding claim 29, modified Becker, as discussed in claim 25 above, discloses a gas permeable layer (4) within the hollow interior region of the chamber (see Fig. 1), the gas permeable layer having the plurality of catalyst nanoparticles thereon in a non-fluidized state (paragraph 32), but does not disclose the fluidizing input (10) at a 45 degree angle relative to the gas permeable layer (see Fig. 1).

However such modification is a mere rearrangement of the system parts that would not modify the operation of the system, and would have been obvious to one of ordinary skill in the art at the time of the invention. See In re Japikse, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950).

Regarding claim 30, modified Becker, as discussed in claim 25 above, further discloses product gas, exiting from the hollow interior region through the port, through the gas permeable separation device (as modified by Miller), and recycled back to the fluidizing inlet.

Regarding claims 32 and 33, modified Becker, as discussed in claim 30 above, teaches a filtration device (also called the gas permeable separation membrane) that is configured to detect a drop in pressure across the filter in order to assess the amount of catalyst particles that have collected on the boundary layer (see Miller, col. 5 lines 11-26, where pressure is detected and relayed) and relaying this information to the control device.

Modified Becker, however, does not discloses a second filtration device downstream of the first filtration device (gas permeable membrane) that is configured to generate a signal and relay it to the control device, however, providing a duplicate filtration device would amount to a mere duplication of parts. It has been held that mere duplication of parts has no patentable significance unless a new and unexpected result is produced. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960).

Regarding claim 34, modified Becker further discloses a gas source coupled to the second input (see Miller, 26) for providing the backpressure pulse, and a gas source (see

12 of Becker) coupled to the entrance of the fluidizing material into the hollow interior region (see inlet 10 of Becker).

14. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Becker et al (US 2002/0006368), Zhou (US 6,500,969), Ballantine et al. (US 2006/0078771) and Miller (US 3,615,256) as applied to claim 25 above, and further evidenced by Breton et al. (US 3,997,447).

Regarding claim 26, modified Becker fails to teach the at least one control device is further configured to introduce the backpressure pulse of gaseous material through the gas permeable separation device for about 0.2 seconds and introduce at least one of the contaminated gas and the fluidizing material into the hollow interior region for about 0.8 seconds.

However, it was well known in the art at the time of the invention that the length and frequency of the backpressure pulses, has a significant effect on the performance and operation of a filter that utilizes this method of cleaning (see Breton col. 4 line 67 - col. 5 line 4 and col. 5 lines 36-49, where Breton discloses the preference for frequent backpulses in order to prevent buildup of catalyst on the boundary of a filter). As such, the timing of the backpulses is not considered to confer patentability to the claim, as the length and frequency of the backpulses is a variable that can be modified, as is taught by Breton, is considered a result effective variable. As such, without showing unexpected results, the claimed length of the backpressure pulses cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the length of the backpressure pulses

modified Becker to obtain the desired mixing and flow distribution (In re Boesch, 617 F. 2d. 272,205 USPQ 215 (CCPA 1980)). Since it has been held that where general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (In re Aller, 105 USPQ 223).

15. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Becker et al (US 2002/0006368), Zhou (US 6,500,969), Li et al. (US 6,782,892), Ballantine et al. (US 2006/0078771) and Miller (US 3,615,256) as applied to claim 30 above, and further in view of Choudhary et al. (US 5,936,135).

Regarding claim 31, modified Becker, as discussed in claim 30 above, fails to teach a flame ionization detector in communication between the decontaminated gas passage way and the fluidizing input, such that the decontaminated gas passes through the flame ionization detector to the fluidizing input.

Choudhary discloses a reactor for processing a combustible gas (such as propane, which is also taught by Becker, see paragraph 28 of Becker). Choudhary teaches a flame ionization detector at the outlet of the reactor in order to assess the quality and performance of the product gas and the reactor (col. 12 lines 26-34).

As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to add the gas chromatograph utilizing a flame ionization detector, as taught by Choudhary, in the recycle line of Becker in order to assess the quality and performance of the product gas and the reactor.

Response to Arguments

16. Applicant's arguments filed 7/9/08 have been considered but are moot in view of the new ground(s) of rejection necessitated by amendment.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW J. MERKLING whose telephone number is (571)272-9813. The examiner can normally be reached on M-F 8:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. J. M./
Examiner, Art Unit 1795

/Alexa D. Neckel/

Supervisory Patent Examiner, Art Unit 1795